25 November 1969

Materiel Test Procedure 8-2-136
Deseret Test Center

U. S. ARMY TEST AND EVALUATION COMMAND
COMMODITY ENGINEERING TEST PROCEDURE

IMPREGNATING SETS, CLOTHING, FIELD

1. OBJECTIVE

The objective of this Materiel Test Procedure (MTP) is to establish a uniform procedure for determining and evaluating the technical performance of field clothing impregnating sets in terms of the criteria established by applicable Qualitative Materiel Requirements (QMR), Small Development Requirements (SDR), Technical Characteristics (TC), and other design requirements and specifications.

2. BACKGROUND

The clothing impregnating set is designed to enable troops in the field to treat their clothes, rendering them resistant to chemical warfare agents. Used properly, the set should give clothing the same protective qualities as those provided by treatment at a central impregnating plant.

The impregnite reacts with chemical agent vapors on contact and neutralizes them. Included in the impregnite is a binder which acts as a moisturizing agent, thus keeping the neutralizing chemicals from being dusted off with use. A stabilizing agent reduces the rate of deterioration of the clothing.

3. REQUIRED EQUIPMENT

a. Facilities:

1) Test Area, suitable for impregnating, challenging, decontaminating, and disposing of clothing.
2) Environmental Test Chambers:

a) Temperature/Humidity
b) Fungus
c) Dust
d) Water Immersion
e) Salt Fog
f) Altitude

3) Vibration and Shock Equipment.

b. Fire Fighting and Safety Equipment
c. Protective Clothing
d. Decontamination Equipment
e. Materials Handling Equipment
f. Chemical Agent Detection Kit
g. Meteorological Measuring Equipment:

1) Temperature
2) Barometric Pressure
3) Relative Humidity

h. Clothing suitable for impregnation, new and used
i. Chemical Agents
j. Scales
k. Ruler
l. Camera and Film
m. Actual or Simulated Aircraft

4. REFERENCES

A. USATECOM Regulation 385-6, Verification of Safety of Material During Testing.
B. American Society for Testing and Material Standards (ASTM Standards):

1) D56: Flash Point by Tag Closed Tester.
2) D1310: Flash Point of Volatile Flammable Material by Tag Open Cup Apparatus.
3) D1230: Flammability.
4) D1424; D2261: Tear Strength.

C. MIL-STD-810B, Environmental Test Methods.
D. MIL-STD-1472, Human Engineering Design Criteria for Military Systems, Equipment, and Facilities.
E. MIL-H-46855, Human Engineering Requirements for Military Systems, Equipment and Facilities.
F. MTP 7-1-002, Air Portability and Airdrop Service Testing.
G. MTP 7-2-509, Airdrop Capability of Materiel (General).
H. MTP 7-2-515, Air Transport, (Suitability of Equipment For).
I. MTP 8-2-500, Receipt Inspection.
J. MTP 8-2-503, Rough Handling and Surface Transport.
K. MTP 8-2-510, Decontamination.

5. SCOPE

5.1 SUMMARY

The subtests outlined in this MTP provide general procedures for determining the technical performance of the test item.

The following procedures shall be performed on a selective basis as required to determine if the test item meets the criteria established:

NOTE: Although the details are described in successive paragraphs, the reference may be modified in the test plan except that receipt inspection must be performed first and safety evaluation second. In preparing the test plan, consideration should

be given to the number of test items available, their susceptibility to damage, time available, availability of facilities, reliability and confidence limits set by QMR and SDR, and budget limitations. Subtests deemed most likely to cause failure should be performed first so that the developing agency may have the earliest possible notice of a deficiency.

a. Receipt Inspection - An inspection of the test item as received to (1) determine its physical characteristics and condition, (2) locate defects, and (3) identify damage received during transport. During this inspection the test item will also be serially numbered for subsequent identification.

b. Safety Evaluation - A study to check the safety statement issued by the developing agency and to identify the safety hazards, if any, which must be included in the safety release recommendation required by reference 4A (USATECOM Regulation 385-6).

c. Simulated Environmental Testing - A study to determine the effects of cyclic storage, extreme temperatures, fungus, humidity, dust, and fresh and salt water on the test item.

d. Rough Handling and Surface Transport Tests - A study to determine the effects of rough handling and surface transport on the test item.

e. Air Transportability - A study to determine the ease of transporting the test item by air and the effects of such transport on the test item.

f. Airdrop Capability - A study to determine the ability of the test item to be airdropped.

g. Operational Effectiveness Test - A study to determine if the test item meets specified effectiveness criteria.

h. Human Factors Aspects - An evaluation to assess the ease of using the test item.

5.2 LIMITATIONS

This MTP is oriented toward the evaluation of the impregnating agents, and not the auxilary equipment used for impregnation.

6. PROCEDURES

6.1 PREPARATION FOR TEST

6.1.1 Prescheduling Conditions

A meteorological forecast must be available before the conduct of each outdoor subtest to prevent wasted effort in unsuitable weather.

6.1.2 Safety Statement

The test officer will insure that a safety statement is received from the developing agency before testing is commenced and that it is understood by all test personnel. The safety statement includes information pertaining to the test item's operational limitations and specifies hazards peculiar to the item or components which are to be tested.

6.1.3 Safety Procedures

a. Test plans and procedures will insure performance in the safest manner consistent with accomplishing the mission. Plans will include safety procedures, precautions, protection, and emergency procedures as necessary. Technical information on the hazards and safety characteristics of the test item as provided by the safety statement and other pertinent information will be included. Such information will include an evaluation of potential hazards, analysis of risks, limitations, precautions, including special test equipment and techniques that should be incorporated in test plans and procedures, and the adequacy of safety provisions and instructions in the Technical Manual (TM).

b. One individual will be charged with responsibility for safety. He will be familiar with the construction and use of the test item and its critical components, will have full knowledge of the hazards and safety aspects of the test, will review test procedures for evaluation of hazards, and will recommend control measures.

c. All personnel who participate in or observe the tests will be briefed on the proper test methods and procedures.

d. Test personnel are to be able to use chemical agent detector kits, recognize symptons of chemical agent poisoning in themselves and others, and use first-aid and decontamination procedures.

e. A record will be kept of any injuries suffered by test personnel during testing, regardless of how minor they may be and regardless of their relevance to testing.

6.1.4 Security

Security considerations will be provided for as applicable to each of the procedures described in this MTP.

6.1.5 Logistical Requirements

Prior to the conduct of any subtest, the test officer will insure that all logistical requirements are satisfied. Essential requirements are:

a. Test clothing of the sorts for which the test item is intended, in need of impregnation, partly in new, unimpregnated condition and partly in worn but usable condition.

b. Suitable quantities of each of the types of chemical agent against which the test item is intended to provide protection.

c. A test site with facilities for impregnating, challenging, and decontaminating clothing.

6.2 TEST CONDUCT

6.2.1 Receipt Inspection

Subject the test item to the applicable procedures of MTP 8-2-500 following its arrival at the test site, with emphasis on the following:

a. Determine the adequacy of packaging by visually inspecting the

test item package and record the following:

1) Binding deficiencies such as broken straps, seals, etc.
2) Packaging material deficiencies such as cuts, tears, breaks, etc.
3) Split, splintered or mildewed wood.
4) Illegible or missing markings.
5) Presence of TM and other required instructions.

b. Measure and record following for the test item package:

1) Length, width and height
2) Weight

c. Unpackage the test item and perform the following:

1) Visually inspect the test item for damage such as corrosion of metal cans, deterioration of fiber drums, dents, cracks, etc.
2) Determine integrity of all containers and absence of leakage.
3) Ascertain the legibility of the instruction card, if provided.
4) Measure and record the following for the test item:

a) Dimensions
b) Weight

d. Number serially and identify each test item to be used.
e. Photograph damaged test items, if any.
f. Prepare an Equipment Performance Report (EPR) as applicable.

6.2.2 Safety Evaluation

a. Perform checks as required to verify all the safety aspects included in the safety statement prepared by the developing agency. Record deficiencies and recommended inclusions.

b. Record information for inclusion in the safety release recommendation required by reference 4A (USATECOM Regulation 385-5).

c. Determine the flammability of the chemical ingredients of the test item using the procedures outlined in ASTM Standards Manual Method D56 and D1310.

d. Determine the effects of the impregnite on the flammability of clothing using the procedures of ASTM Standards Manual D1230 by comparing the following:

1) For untested samples of clothing
2) Samples of clothing treated with the impregnite

6.2.3 Simulated Environmental Testing

6.2.3.1 Cyclic Storage

a. Subject the test item in its packing container to cycles of climatic extremes. A cycle shall consist of three weeks duration as follows: Successive one week tests at humid, low temperature, and high temperature. Chamber conditions for each climatic condition are as follows:

1) Humid Storage. The chamber shall be maintained at 113°F ±2°F and 85% R.H. for the duration of the test.
2) Low Temperature Storage. The chamber shall be maintained at -65°F ±2°F for the duration of the test.
3) High Temperature Storage. The chamber shall be maintained at 160°F ±2°F for the duration of the test.

b. The test item shall be subjected to a minimum of three such cycles, or more if specified. Upon completion of each cycle, the container and contents shall be examined for damage.

6.2.3.2 Extreme-Temperature Tests

Unless obviated by design requirements, the test item will be subjected to the following temperature tests:

6.2.3.2.1 Low-Temperature Test - Place a minimum of three test items in a test chamber, and perform the following:

a. Reduce the chamber temperature to -45.5°C (-50°F) and maintain it at -45.5°C (-50°F) for a period of 72 hours; then visually inspect the test items and record damage or leakage from the containers.

b. Adjust the chamber temperature to the test item's minimum usable temperature as established by design requirements, and maintain this temperature until stabilization is reached. If stabilization is attained in less than 24 hours, maintain the temperature for a complete 24-hour interval. Perform the following:

NOTE: Stabilization, unless otherwise specified, is considered to be reached when the temperature of the test item does not change more than 2°C (3.6°F) per hour.

1) Visually inspect the test items, and record damage and leakage of containers.
2) Remove one third of the test items, and verify effectiveness as described in paragraph 6.2.7.

NOTE: Effectiveness checks should be begun within 15 minutes of removing the test item from the chamber.

c. Remove the remaining items from the chamber, allow their temperature to stabilize at local ambient conditions, and perform the following:

1) Visually inspect the test items and record damage and leakage of containers.
2) Verify the effectiveness of the test items by subjecting

them to the procedures of paragraph 6.2.7.

6.2.3.2.2 High-Temperature Test - Place a minimum of three test items in a temperature chamber, and perform the following:

a. Adjust the temperature of the chamber to 71°C (160°F) and a relative humidity of 15 percent, maintain these conditions for a minimum of 4 hours, and visually inspect the test items and record any damage.

b. Adjust the chamber to a temperature of 48.9°C (120°F) and a relative humidity of no more than 15 percent, and maintain these conditions for a minimum of 24 hours. Then perform the following:

1) Visually inspect the test item, and record damage and leakage of containers.
2) Remove one third of the test items, and verify their effectiveness by subjecting them to the procedures of paragraph 6.2.7.

c. Remove the remaining test items from the chamber, subject them to local ambient temperature and humidity for 24 hours, and perform the following:

1) Visually inspect the test items and record damage and leakage of containers.
2) Verify the effectiveness of the test items by subjecting them to the procedures of paragraph 6.2.7.

6.2.3.3 Fungus Test

a. Subject a minimum of three test items to the fungus test of Procedure I, Method 508, reference 4C (MIL-STD-810B).

b. At the completion of the cycling period, perform the following:

1) Visually inspect the items, and record any signs of mildew and contamination.
2) Verify the integrity of all containers and the absence of leakage.
3) Determine the condition and legibility of the instruction card.
4) Open two thirds of the test items, and inspect their contents for the presence of fungus.
5) Verify the effectiveness of the items by subjecting a suitably determined number of test items to the procedures of paragraph 6.2.7.

6.2.3.4 Humidity Test

a. Subject a minimum of three packaged test items to the humidity cycling of Procedure I, Method 507, reference 4C (MIL-STD-810B).

b. At the completion of the cycling period, perform the following:

1) Verify the integrity of all the containers and the absence of leaks.

2) Open a minimum of two of the test items and inspect their contents for the presence of moisture or corrosion.
3) Verify the effectiveness of the test item by subjecting the test items to the procedures of paragraph 6.2.7

6.2.3.5 Dust Test

a. Subject a minimum of three test items to the exposure conditions of Procedure I, Method 510, reference 4C (MIL-STD-810B).
b. At the completion of the exposure period, perform the following:

1) Visually inspect the test items, and record any surface damage noted.
2) Open a minimum of two test items, and inspect the contents for contamination.
3) Verify the operability of the test items by subjecting the test items to the procedures of paragraph 6.2.7.

6.2.3.6 Water Immersion Tests

a. Subject a minimum of two of the test items in their shipping containers to the water immersion conditions of Procedure I, Method 512, reference 4C (MIL-STD-180B).

NOTE: If the design requirements specify depth of water, water temperature, or time of immersion different from the standard procedure, use the values specified in the design requirements.

b. Record the following:

1) Depth of water over container
2) Temperature of the water
3) Presence of bubbling to indicate container leakage
4) Immersion time until bubbling occurs
5) Total immersion time

c. At the completion of the immersion test, remove the test items from their shipping containers and perform the following:

1) Visually inspect the shipping containers for, and record the presence of, water penetration.
2) Open the test item container and inspect the contents for contamination.

6.2.3.7 Salt Fog Test

a. Subject a minimum of three test items to the procedures of Procedure I, Method 509, reference 4C (MIL-STD-810B).
b. At the completion of the salt fog spray exposure, perform the following:

1) Rinse the test items with clear water.
2) Visually inspect the containers for the presence of corrosion.
3) Determine the integrity of the fiber drum and any indication of leakage.
4) Open a minimum of two of the test items, and inspect their contents for evidence of water penetration.
5) Verify the effectiveness of the test items by subjecting the test items to the procedures of paragraph 6.2.7.

6.2.4 Rough Handling and Surface Transport Test

a. Subject a minimum of two of the test items to each of the following procedures of MTP 8-2-503:

1) The vibration test of paragraph 6.2.2.2a.3)
2) The shock test of paragraph 6.2.2.1a.2)

b. At the completion of each test, perform the following:

1) Examine the test item case for damage.
2) Visually inspect the test items, and record damage and leakage of containers.

6.2.5 Air Transportability

Subject the packaged test item to the applicable procedures of MTP 7-2-515 or the following:

NOTE: Background information on air transportability is contained in MTP 7-1-002.

6.2.5.1 Loading and Unloading

Determine the ease of loading and unloading the test item from an aircraft as follows:

a. Load the test item in its shipping container aboard a typical cargo aircraft or simulated aircraft, using current standard loading equipment, and record the following:

1) Type of aircraft used or simulated
2) Shipping container length, width, height, weight, and material
3) Equipment used for loading
4) Difficulties encountered while loading
5) Method of tiedown
6) Any damage sustained by the package during loading

b. Unload the test item from the aircraft or simulated aircraft, and record the following:

1) Equipment used in unloading

2) Difficulties encountered while unloading
3) Damage sustained by the package during unloading

6.2.5.2 Simulated Flight Test (Altitude Chamber Test)

a. Subject a minimum of two test items, in their shipping containers, to the following simulated conditions simultaneously:

1) Ambient pressure at altitude of 50,000 ft (or maximum altitude at which the test item must be capable of being flown, if stated in design requirements).
2) Flight vibration conditions as described in the procedures for equipment class g (shipment by common carrier) of Procedure X, Method 514, reference 4C (MIL-STD-810B). The test level will be in accordance with curve AB, figure 514-6, and time schedule IV of table 514-II in the referenced procedure.

b. At completion of the simulated altitude and vibration test, perform the following:

1) Examine the test item's container for cracks, breaks, etc.
2) Examine the test item for damage.
3) Verify the integrity of the containers and the absence of leaks.

6.2.6 Airdrop Capability

Subject a minimum of 10 test items, packaged in their original containers, to the applicable sections of MTP 7-2-509, as follows:

a. Rig the test containers, with accelerometers attached, in appropriate airdrop containers, and drop the containers from typical air raft as instructed by the referenced MTP. Record the following:

1) Aircraft type(s) used
2) Aircraft airspeed
3) Altitude
4) Air delivery system trajectory
5) Meteorological conditions
6) Impact velocities
7) Deceleration magnitude at impact in g's

b. Conduct visual coverage of the airdrop test procedures with still and motion cameras.

c. At the completion of the test, perform the following:

1) Examine the test item's packaging for breaks, undone bindings, etc.
2) Examine the test items for damage and leaks.

6.2.7 Operational Effectiveness Test

NOTE: Effectiveness tests will be conducted in accordance with current Army standard practices unless the test item has exceptional characteristics as noted in its QMR, SDR, TC or other design requirements documents. The test site will meet all safety requirements for chemical agent testing and will include facilities for impregnating, challenging, decontaminating, and disposing of clothing. If outdoors, the test site should be shaded from direct sunlight unless otherwise specified by the test plan.

a. Describe the following for each impregnate effectiveness test performed as applicable.

1) The test site
2) Meteorological conditions for outdoor tests

b. Prepare impregnite according to instructions provided with the set, and record the following:

1) Test item identification number
2) Procedures used
3) Adequacy and completeness of instructions
4) Time required
5) Personnel required
6) Auxiliary equipment required, if any
7) Difficulties encountered

c. Impregnate clothing and record the following:

NOTE: Retain several samples of clothing for control purposes

1) Types of clothing and condition
2) Prewetting procedures
3) Wetting and wringing procedures
4) Adequacy and completeness of instructions
5) Time required
6) Personnel required
7) Auxiliary equipment required
8) Difficulties encountered

d. Dry the clothing and record the following:

1) Method of drying
2) Special handling of clothing during drying operation
3) Time required
4) Personnel required
5) Difficulties encountered

e. Evaluate the effects of the impregnite and record the following:

1) Effect on skin

2) Effect on comfort.
3) Evident effect on clothing including tear strength as determined using procedures D1424, and D2261 of ASTM standards manual.

NOTE: Samples of the clothing should be submitted to the ASTM tests prior to being impregnated.

f. Store samples of the impregnated clothing and the unimpregnated samples for a minimum of a month or as specified in the test directive and perform the following:

1) Measure and record environmental condition during storage, including:

a) Temperature
b) Relative humidity

2) Record the length of storage period.
3) At the completion of the storage period, determine the following:

a) Tear strength of fabrics using the procedures D1424 and D2261 of ASTM standards manual.
b) pH of clothing
c) Effectiveness of impregnite against agents as described in step g.

g. Determine the effectiveness of the impregnite by performing the following:

1) Challenge one fourth of the treated clothing with the intended chemical agents and record the following:

a) Condition of clothing (i.e. new or used)
b) Time since impregnation
c) Agent used
d) Level and method of contamination

2) Using a chemical agent detector kit, sample the backside of the clothing each half hour after the initial challenge, or at intervals as specified, for a period of 12 hours or until the impregnite is defeated by the chemical agent. Record the results of each measurement.
3) Decontaminate the clothing using procedures as described in the applicable sections of MTP 8-2-510 and record pertinent data.
4) Inspect the clothing and record suitability for reimpregnation.
5) Repeat steps 1 through 4 using clothing which is wet.
6) Repeat steps 1 through 5 using clothing which has undergone

field usage after being impregnated.

6.2.8 Human Factors Aspects

a. Throughout the conduct of the test, observations will be made regarding the human factors aspects of the test item.

NOTE: Consult references 4D (MIL-STD-1472) and 4E (MIL-STD-46855) for discussions of the human factors relevant to the items under test.

b. Record all inconveniences encountered in handling and using the test item and any accompanying instructional materials. Specific aspects to be observed will include the following:

1) Compatibility with field clothing and equipment, particularly with protective clothing.
2) Simplicity and adequacy of operating instructions.
3) Conformance of the test item's design to qualitative requirements, particularly whether it is as compact and light as possible commensurate with functional characteristics.
4) Legibility of identification markings.
5) Reactions of test personnel when operating equipment.
6) Ease of identifying items and components under daylight, darkness, and blackout conditions.
7) Need for special tools or special handling.

6.3 TEST DATA

6.3.1 Receipt Inspection

Record data collected or described in the applicable sections of MTP 8-2-500 and the following:

a. For the packaged test item:

1) Evidence of binding deficiencies
2) Cuts, tears, or breaks in packaging
3) Split, splintered or mildewed wood
4) Illegible or missing markings
5) Presence of instructions
6) Length, width and height, in inches
7) Weight, in pounds

b. For the test item:

1) Evidence of damage or corrosion of containers
2) Evidence of container leakage
3) Legibility of instruction card
4) Dimensions, in inches
5) Weight, in pounds

c. Retain all photographs

6.3.2 Safety Evaluation

Record the following:

a. Test item flammability data collected as described in ASTM D56 and ASTM D1310.
b. Flammability of clothing:

1) Untested
2) Impregnated

c. Data collected for inclusion in Safety Release Recommendations.

6.3.3 Simulated Environmental Tests

6.3.3.1 Cyclic Storage

Record the following for each cycle for each test item:

a. Test item identification number
b. Cycle number
c. Damage to:

1) Container
2) Test item

6.3.3.2 Extreme Temperature Tests

6.3.3.2.1 Low Temperature Tests -

Record the following for each test item, as applicable:

a. Test item identification number
b. For temperature of -45.5°C (-50°F)

1) Damages incurred by and/or leakage from the containers

c. For minimum operating temperature

1) Test temperature in °C (°F)
2) Damages incurred by and/or leakage from the containers
3) Effectiveness data collected as described in paragraph 6.2.7

d. For ambient temperature:

1) Temperature in °C (°F)
2) Damages incurred by and/or leakage from the containers
3) Effectiveness data collected as described in paragraph 6.2.7

6.3.3.2.2 High Temperature Tests -

Record the following for each test item, as applicable:

a. Test item identification number
b. For temperature 71°C (160°F):

    1) Exposure time in hours
    2) Damages incurred by and/or leakage from the containers

c. For temperature of 48.9°C (120°F)

    1) Damages incurred by and/or leakage from containers
    2) Effectiveness data collected as described in paragraph 6.2.7

d. For ambient temperature:

    1) Temperature in °C (°F)
    2) Humidity in %
    3) Damages incurred by and/or leakage from containers
    4) Effectiveness data collected as described in paragraph 6.2.7

6.3.3.3 Fungus Test

Record the following for each test item:

a. Test item identification number
b. Damages incurred by and/or leakage from containers
c. Presence of fungus on:

    1) Test item
    2) Test item components

d. Condition and legibility of instruction card
e. Effectiveness data collected as described in paragraph 6.2.7

6.3.3.4 Humidity Test

Record the following for each test item:

a. Test item identification number
b. Evidence of corrosion on containers
c. Evidence of container leakage
d. Presence of moisture in test item
e. Effectiveness data collected as described in paragraph 6.2.7

6.3.3.5 Dust Test

Record the following for each test item:

a. Test item identification number

b. Damage to container surface
c. Presence of dust in test item
d. Effectiveness data collected as described in paragraph 6.2.7

6.3.3.6 Water Immersion Tests

Record the following for each test item, as applicable:

a. Test item identification number
b. During immersion:

1) Depth of water over container, in inches
2) Water temperature, in °F
3) Presence of bubbling, if any
4) Immersion time to bubbling, if any, in minutes
5) Total immersion time, in minutes

c. Evidence of water penetration to shipping container
d. Evidence of test item contamination

6.3.3.7 Salt Fog Test

Record the following for each test item, as applicable:

a. Test item identification number
b. Evidence of corrosion on test item container
c. Evidence of leakage
d. Evidence of water penetration
e. Effectiveness data collected as described in paragraph 6.2.7

6.3.4 Rough Handling and Surface Transport

a. Record the following for each item tested:

1) Test item identification number
2) Test performed (vibration, shock)
3) Damages incurred to test item case
4) Damages incurred by and/or leakage from test item containers

b. Retain all photographs

6.3.5 Air Transportability

6.3.5.1 Loading and Unloading

Record data collected as described in MTP 7-2-515, or the following, as applicable:

a. Type of aircraft used or simulated
b. Shipping container:

1) Length, width and height, in inches
2) Weight, in pounds
3) Material

c. Equipment used in loading
d. Difficulties encountered while loading
e. Damage incurred to the container while loading
f. Method of tiedown
g. Equipment used in unloading
h. Difficulties incurred in unloading
i. Damage incurred to the container while unloading

6.3.5.2 Simulated Flight Test

Record the following for each test item, as applicable:

a. Altitude simulated, in feet
b. Test item identification number
c. For test item shipping container:

1) Presence of cracks, breaks, etc.
2) Undone binding, if applicable

d. Damage incurred by and/or leakage from test item containers

6.3.6 Airdrop Capability Tests

a. Record the following for each test item:

1) Test item identification
2) Aircraft used
3) Aircraft airspeed
4) Aircraft altitude
5) Air conditions (calm, turbulent, etc.)
6) Air delivery system trajectory
7) Test item impact velocity, in fps
8) Force of impact, in g's
9) For test item package:

a) Presence of cracks, breaks, etc.
b) Undone binding

10) Damages incurred by and/or leakage from test item container

b. Retain all pictures

6.3.7 Operational Effectiveness Test

Record the following:

a. For each test performed, as applicable:

1) Test site
2) Meteorological conditions

b. For preparation of impregnite:

1) Test item identification number
2) Procedure used
3) Adequacy and completeness of instructions
4) Time required, in minutes
5) Number of personnel required
6) Auxiliary equipment required
7) Difficulties encountered

c. For impregnation operations:

1) Types of clothing and condition
2) Prewetting procedures
3) Wetting and wringing procedures
4) Adequacy and completeness of instructions
5) Time required, in minutes
6) Number of personnel required
7) Auxiliary equipment required
8) Difficulties encountered

d. For drying operations:

1) Method of drying
2) Special handling of clothing during drying operation
3) Time required, in minutes
4) Personnel required
5) Difficulties encountered

e. For the effects of the impregnite:

1) Effect on personnel skin
2) Effect on comfort
3) Effect on clothing including change in tear strength

f. For storage tests:

1) Environmental conditions:

a) Temperature in °F
b) Relative humidity in %

2) Length of storage period, in days
3) Tear strength of clothing
4) pH of clothing
5) Effectiveness data collected as described in step g

g. For effectiveness of impregnite:

1) Condition of impregnite (newly treated or worn).
2) Amount of water in clothing (wet or dry).
3) Condition of clothing (new or used).
4) Time since impregnation.
5) Challenging agent used.
6) Level and method of contamination.
7) For chemical agent sampling:

   a) Length of time since challenge
   b) Results of sampling

8) Decontamination data collected as described in the applicable sections of MTP 8-2-510.
9) Suitability of clothing for reimpregnation.

6.3.8 Human Factors

Record the following:

a. Compatibility with field clothing and equipments.
b. Simplicity and adequacy of instructions.
c. Adequacy of design (size and lightness).
d. Legibility of markings.
e. Reactions of user personnel.
f. Ease of identifying components under daylight, darkness, and blackout conditions.
g. Need for special tools or special handling.

6.4 DATA REDUCTION AND PRESENTATION

6.4.1 Receipt Inspection

a. Data collected as a result of this procedure will be presented as indicated in the applicable portions of MTP 8-2-500.
b. The description of the test item, number of items tested, and conditions upon receipt will be presented in tabular form.
c. Results of the leak subtest shall be presented in narrative or other convenient form.
d. Photographs and X-ray pictures shall be used to substantiate results.

6.4.2 Safety Evaluation

A Safety Release Recommendation as required by USATECOM Regulation 385-6 will be forwarded to the U. S. Army Test and Evaluation Command within 30 days of the beginning of the test. The Safety Release Recommendation will describe special safety considerations or hazards to personnel and materiel, including flammability of the test item and comparison of flammability of impregnited and untreated articles of clothing.

6.4.3 Simulated Environmental Testing

a. The results of the subtests conducted will be presented in tabular or other suitable form.

b. The results of the operational check tests performed at the conclusion of the various environmental tests will be presented in narrative or other suitable form.

6.4.4 Rough Handling and Surface Transport Tests

a. Rough handling and surface transport data will be presented as prescribed in MTP 8-2-503.

b. Vibration and shock data will be presented in tabular form to indicate test times, distances dropped, shock levels, vibration frequencies, etc., and significant findings of the test. Include photographs of damage.

6.4.5 Air Transportability Test

Data will be presented in summary form as indicated in the applicable portions of MTP 7-1-002, MTP 7-2-515 and other pertinent testing instructions.

6.4.6 Airdrop Capability Tests

a. The results of the subtest will be presented as prescribed in MTP 7-2-509 and shall include the following:

1) Type of aircraft
2) Airspeed, altitude, and meteorological conditions
3) Packaging material condition after test
4) Maximum force, in G's, on opening of parachute and on impact

b. Present narrative comments and data regarding ease or difficulty encountered in accomplishing airdrop. Present photographs as required to indicate results of airdrop.

6.4.7 Operational Effectiveness Test

Data derived from this subtest will be presented in narrative form supplemented by charts, tables, graphs or any other suitable means of displaying information. The report will clearly conclude whether the test item meets the criteria established in applicable specifications and indicate the effect of ambient weather conditions, method of drying and time on the effectiveness of the test item, and the effect of the test item on personnel and impregnated clothing.

6.4.8 Human Factors Aspects

a. Data from this subtest will be presented in tabular, narrative, or other suitable form supplemented by photographs and graphic or art presentations as required.

b. A summary of comments regarding shortcomings and recommended improvements will be presented.

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13. ABSTRACT
This Engineering Test Procedure describes test methods and techniques for evaluating the technical performance and characteristics of Impregnating (Chemical Warfare Agent Resistant) Sets for Field Clothing in terms of the criteria established by applicable Qualitative Materiel Requirements (QMR), Small Development Requirements (SDR), Technical Characteristics (TC), and other design requirements and specifications.

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